



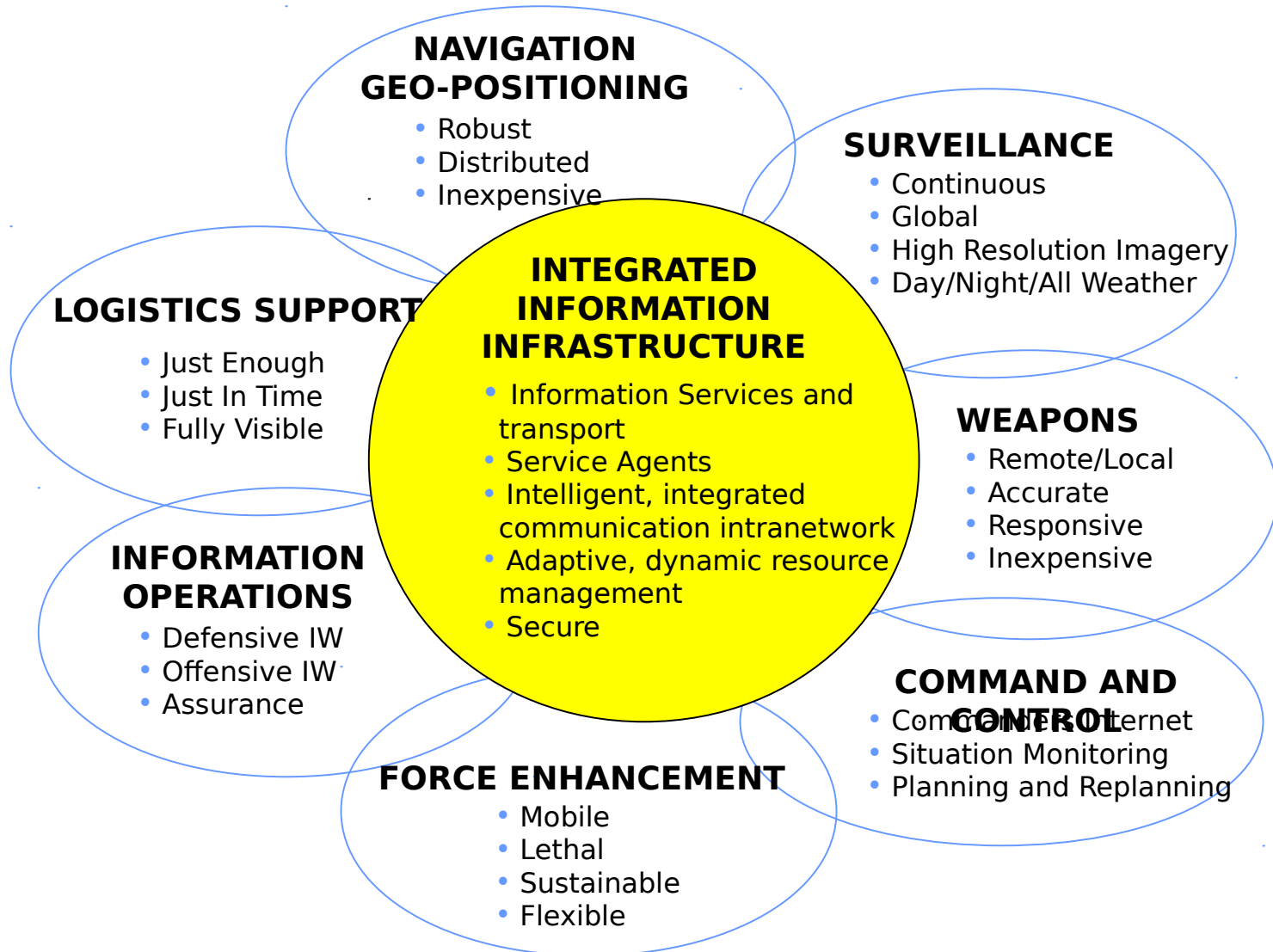
# ***Implementing the Global Information Grid (GIG)***

## ***A Foundation For 2010 Net Centric Warfare (NCW)***

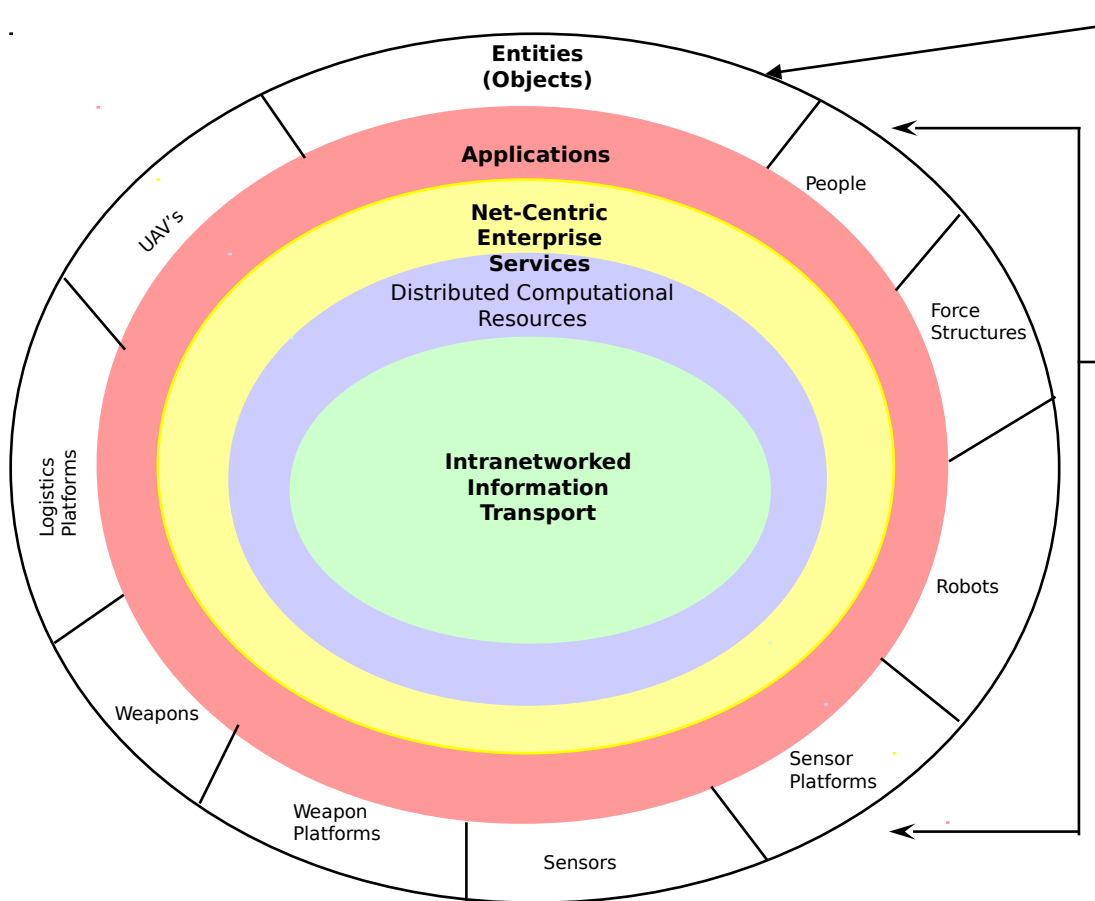
Frank Criste  
Director, Communications Programs  
OASD(NII) - DASD(C3, Space & IT Programs)  
703-607-0270

***18 May 2004***

# Global Information Grid (GIG)



# ***GIG: A Conceptual View***



- **Entities**

- Sources and users of information
- Diversity of information needs
  - Type, quantity, timeliness
  - Change as a function of mission & situation

- **Information infrastructure (II) functional decomposition**

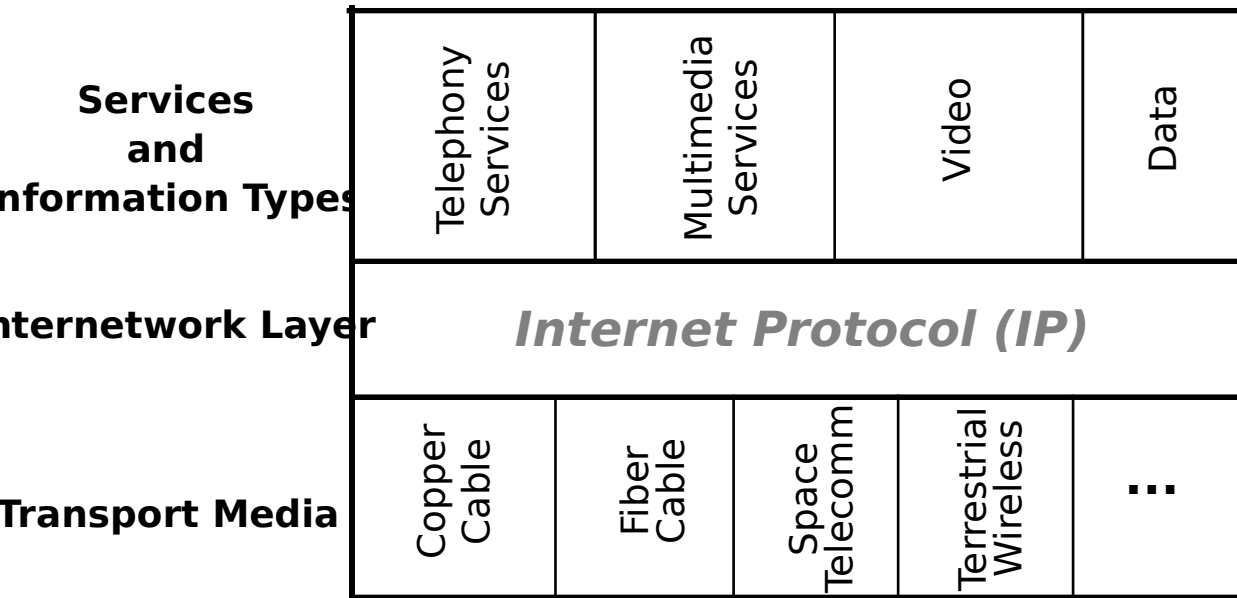
- Layer concept. Each layer:
  - Provides services to layer above
  - Receives services from layers below
  - Dynamically adapts to meet information needs of entities
  - Tightly coupled to each other to permit adaptation as an integrated system

**Power to the Edge**

# ***Emerging Network Centric Capabilities Enabled by the GIG***

- **Improve collaboration and carry out surveillance, reconnaissance, and targeting at all levels of command**
- **Improve decision support to decrease C2 decision cycle times**
  - **Smaller, highly mobile forces**
  - **Command and Control on the Move (COTM)**
- **Facilitate rapid force deployment and flexible unit composition**
- **Facilitate Machine to Machine communication “behind the dashboard integration”**
- **Move beyond Situational Awareness to “Situational Understanding”**
- **“Eliminate the human intermediary as a conduit of information” (target coordinates, tasking, etc.)**
- **Eliminate the ‘seams’ between operational stages, multi-national forces, and decision makers**
- **Improve timeliness of Sensor cueing and cooperative engagements (i.e. mid-course weapon updates from remote sensors)**

# ***GIG: IP Based***



**The convergence layer!**

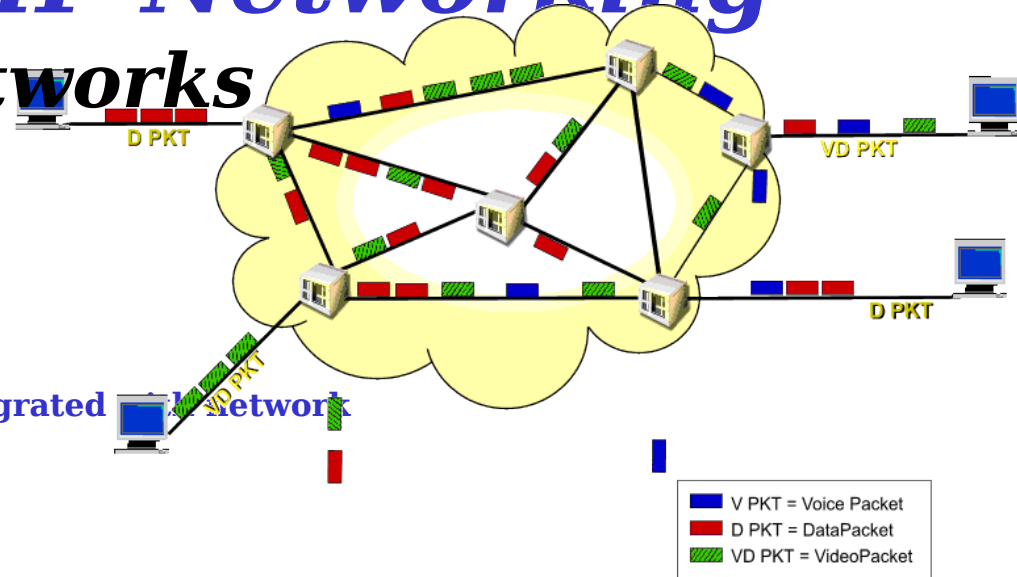
**Facilitate Interoperability**

- ***World-wide acceptance and use***
- ***Packet-switched Internet transport***
- ***Provides common-user, integrated services framework***
- ***Provides standardized interface between Application and Transport Services***
- ***Used over many network-level protocols (Ethernet, ATM,***

# *Features of IP Networking*

## *GIG: Network of Networks*

- **Basic IP is a connectionless network**
- **IP Networking makes it easier to scale**
  - **Services and applications not tightly integrated infrastructure**
    - Keeps complexity out of network core
    - Allows fast creation of new services
  - **Designed for information sharing**
- **Allows for autonomous decisions by network nodes in processing each packet**
  - Packets carry globally meaningful addresses
  - Distributed processing throughout the network
- **Provides for redundancy, improves scalability**



**Build The Net**

**R = Internet Router or JTRS WNW**

**Tier 4 Global Coverage**

GEOS

**Tier 3 Wide Area Coverage**

LEOS

Aircraft

**Tier 2 Inter-Team Coverage**

AAVs

**Tier 1 Team Coverage**

Ground Based

**JTRS**

**GIG-BE**

People Weapons Sensors

**Local Area Network**

**UGS**

**Medium-Area Network**

**Wide-Area Network**

**Global-Area Network**

**TCS**

**Radio**

**Land Line (wire or fiber)**

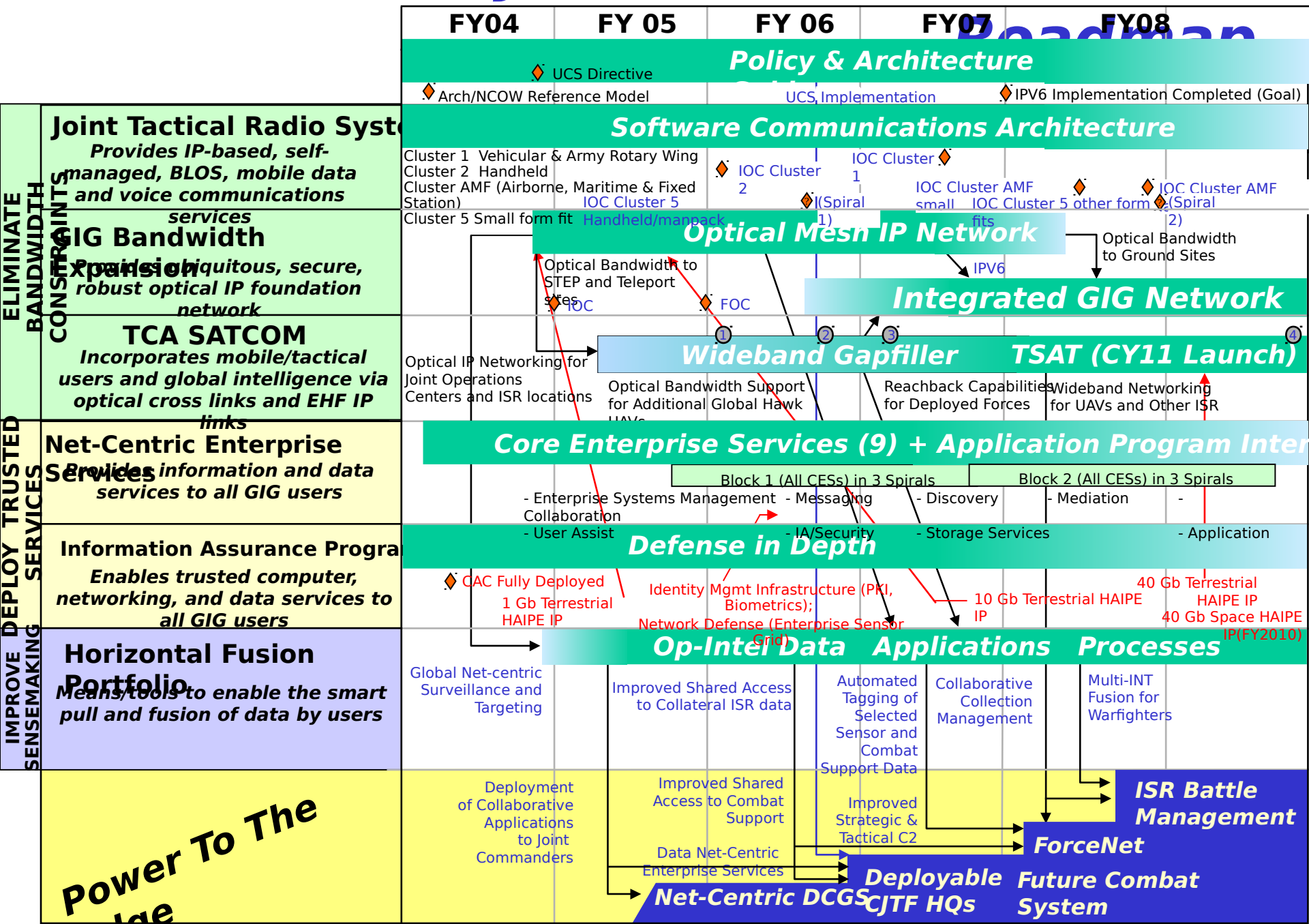
**DWDM**

**GIG-BE**

**ODXC**

# Build The Net

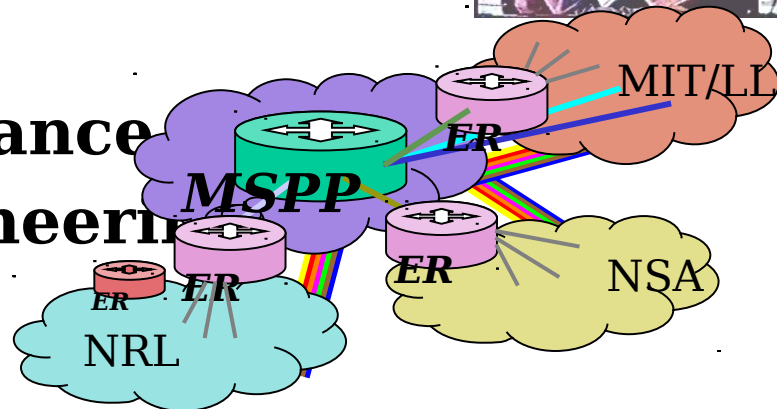
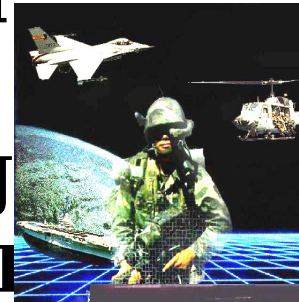
# Key Net-Centric Initiatives



# ***GIG: DoD Investments***

## **The Global Information Grid Development Strategy**

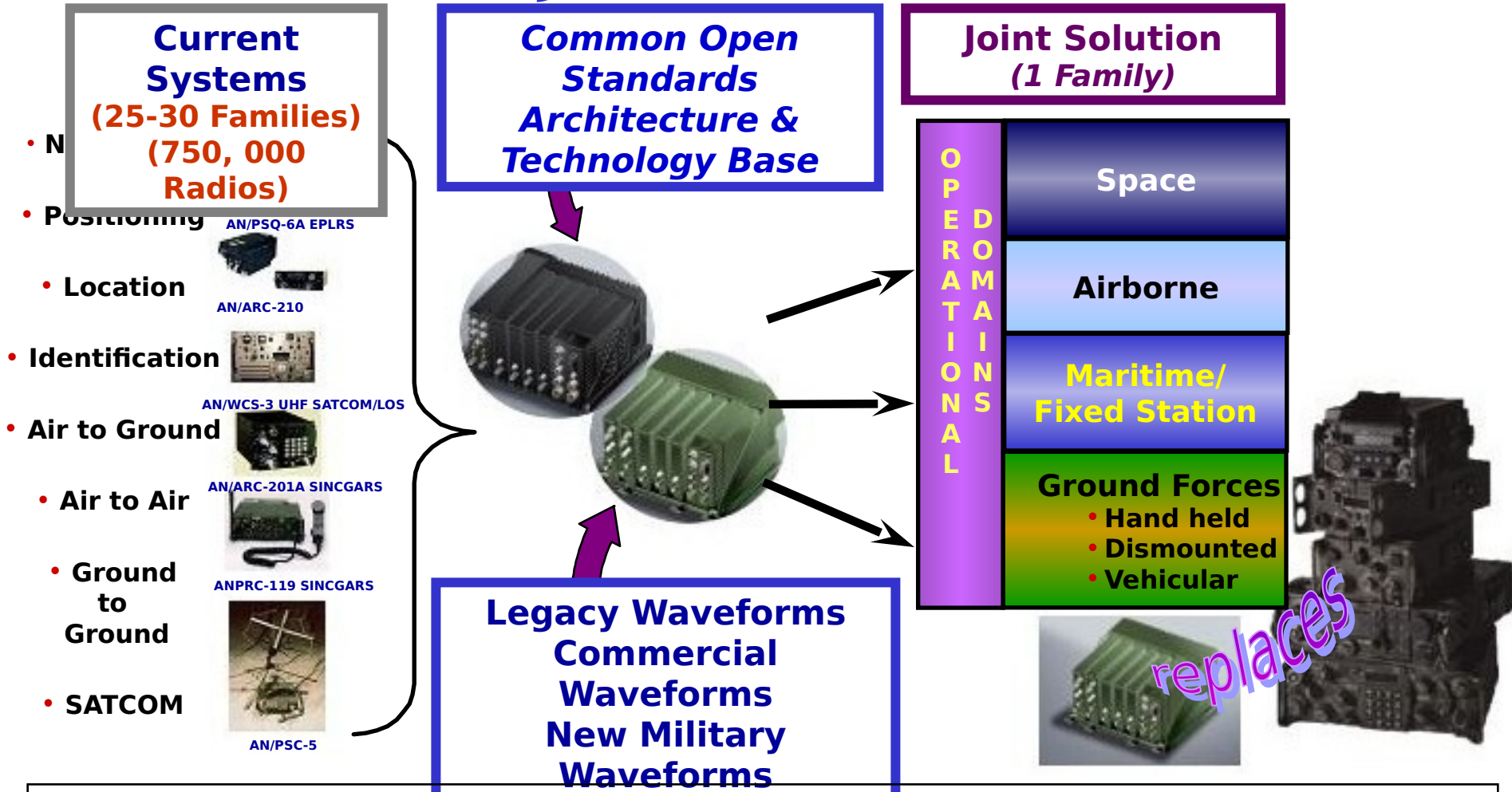
- Joint Tactical Radio System (JTRS)
- GIG Bandwidth Expansion (GIGBE)
- Transformational Communications Satellite (TCS)
- Net-Centric Enterprise Services (NCES)
- Information Assurance
- E2E Systems Engineering



**A Subset Of Several Key Initiatives**

# Joint Tactical Radio System (JTRS)

## A Transformation Enabler



**JTRS - a family of common Radios and Waveforms built around a standard open Software Communications Architecture**

# ***Why JTRS Is Transformational***

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- **Provides a family of SW programmable radios to enable Network Centric Warfare.**
- **Allows for increased interoperability (ultimate solution), technology insertion and spiral development.**
- **Eliminates duplicative radio development efforts and multiple legacy radio systems by consolidating requirements within functional domains.**
- **Enables connectivity to allied/coalition, civil and national authorities.**

**Most importantly: Provides capability for mobile ad-hoc network to achieve network centric capability.**

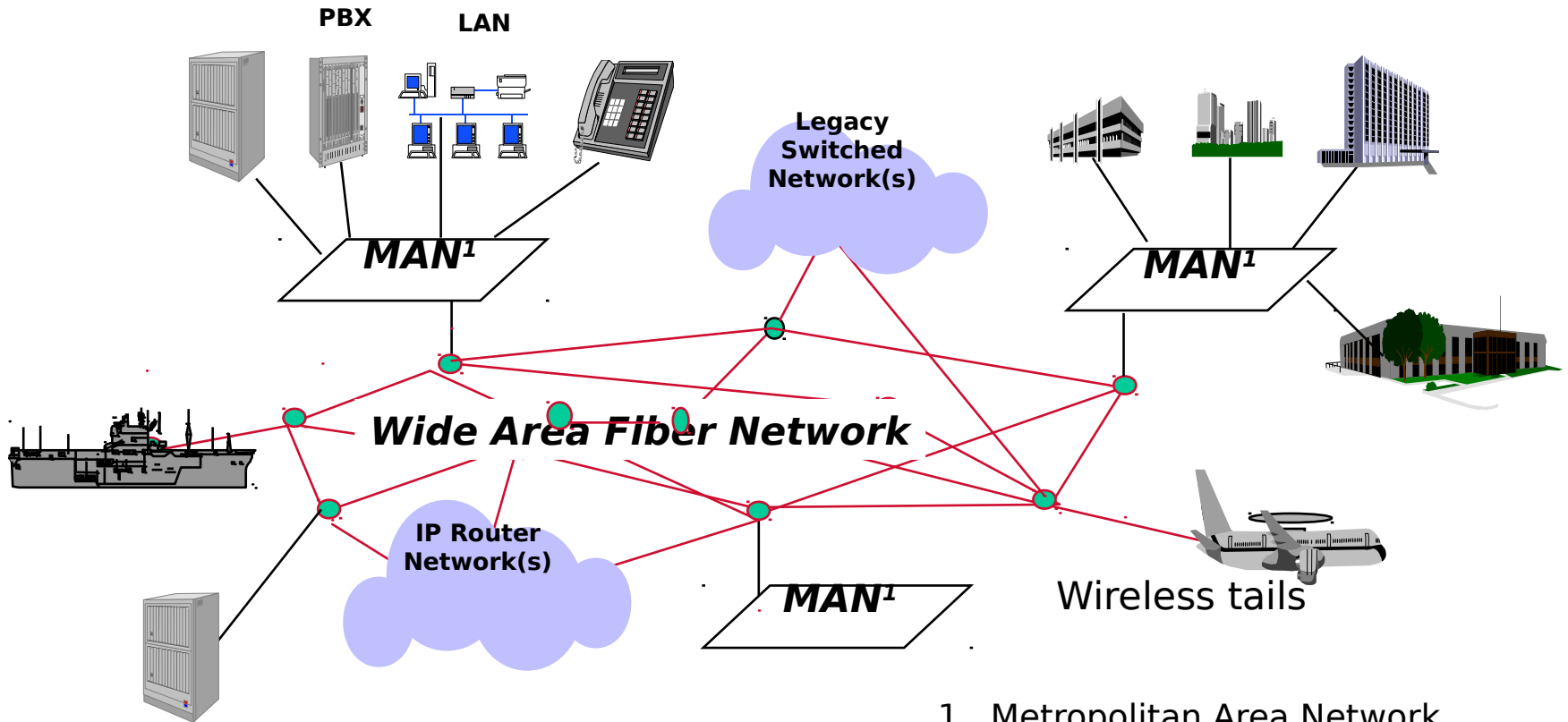
## ***RF EQUIPMENT ACQUISITION POLICY***

- **ASD (NII) memorandum of June 17, 2003 Subject: Radio Frequency (RF) Equipment Acquisition Policy**

**“A recent Department of Defense study and continued technology advancements indicate that expanding the scope of the JTRS/SCA to all waveforms above 2 MHz frequency is now viable. Therefore, to enhance our warfighting capabilities and to improve integration of our communications systems through networking technologies, the reference radio Acquisition Policy [August 28, 1998] is hereby modified to specifically reflect that all such systems, including those operating above 2 GHz, are required to be developed in compliance with JTRS/SCA. The policy is now applicable to all communications waveforms/systems that operate at or above 2 MHz....”**

# ***GIG Bandwidth Expansion***

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1. Metropolitan Area Network

**Provides ubiquitous, secure, robust optical Wide Area Network Internet Protocol (IP) foundation network**

# ***GIG Bandwidth Expansion***

**Optical IP terrestrial backbone with a ubiquitous presence. Mitigates constraints in terrestrial bandwidth.**

- Diverse physical access to the network, the near term effort secure, robust

• ~~CONUS & OCONUS~~

**Investment \$800+M**

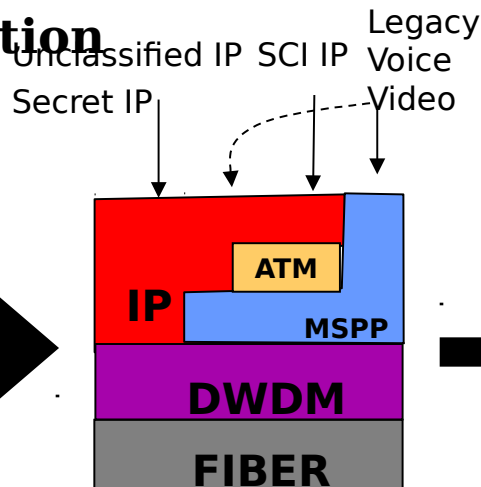
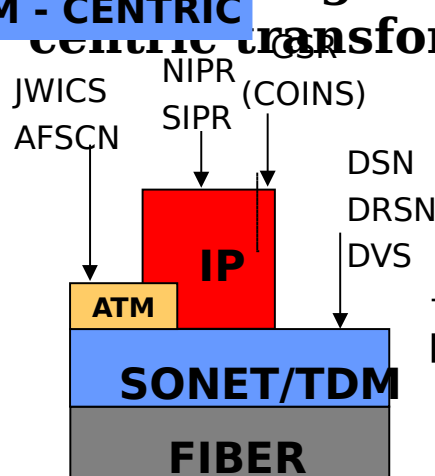
**FY03: \$500+M**

- Requests for Proposals
- Contract awards
- Site surveys
- Installations begin

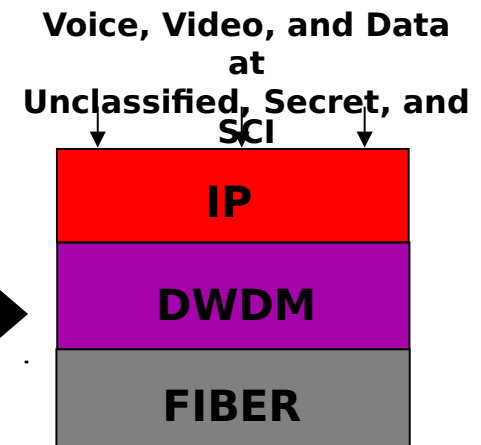
**FY04: \$300M**

- Complete all installations
- Provide minimum 100 Mbps per site per service

**Today:**  
**TDM - CENTRIC**  
**Transformation**

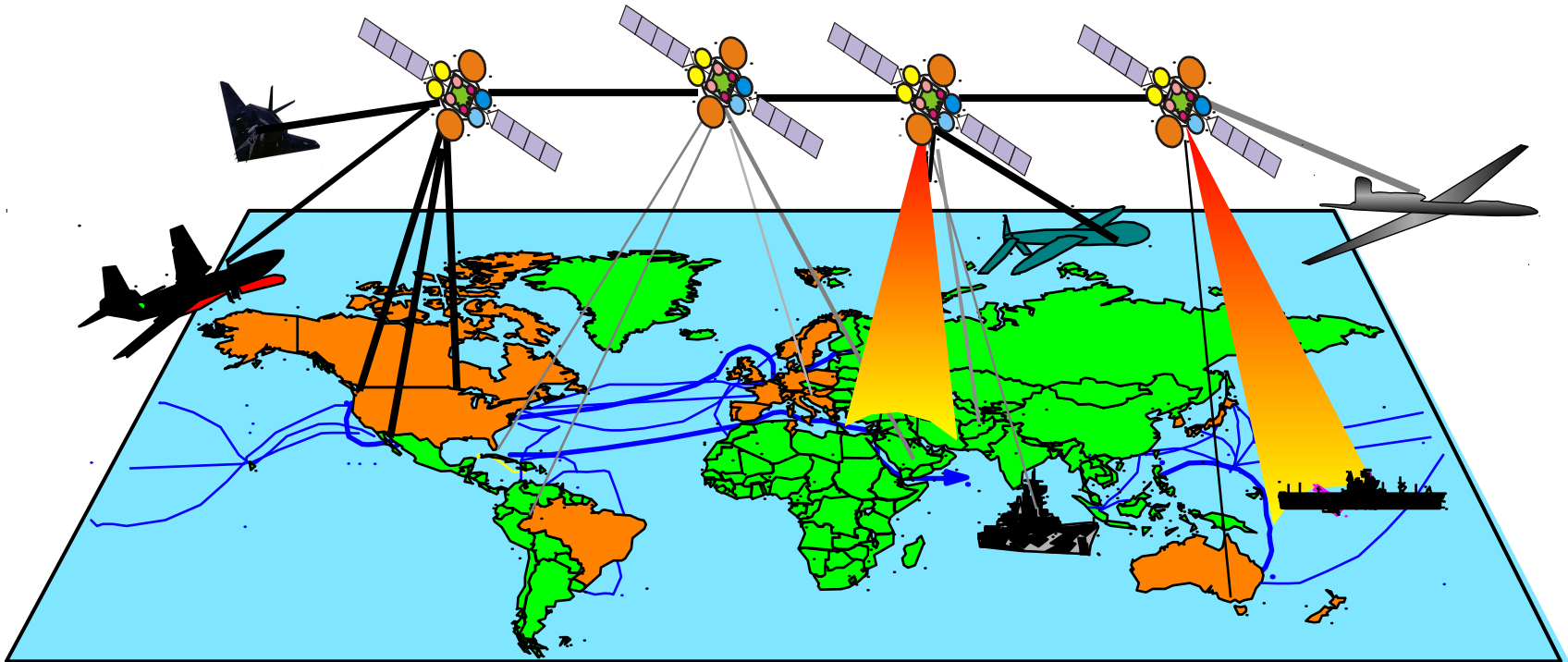


**Tomorrow:**  
**IP - CENTRIC**



# *Transformational Satellite Communications*

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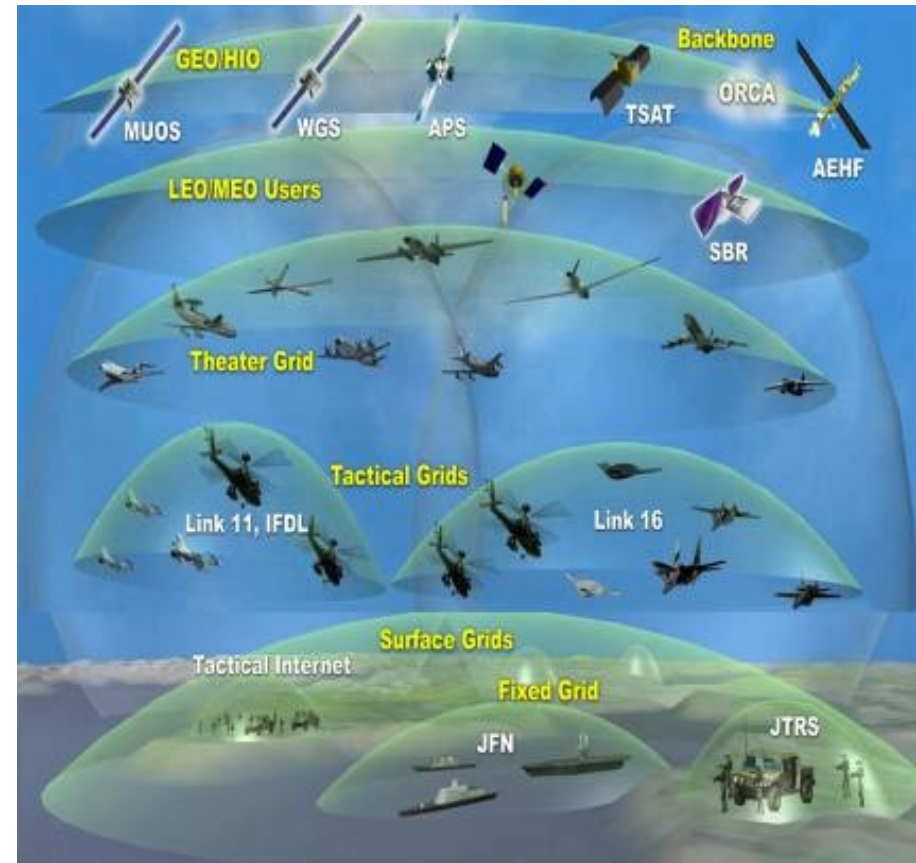
**Integrates mobile/tactical users and global intelligence services via IP (optical comm links and EHF, Ka and X-band)**

# ***Transformational Communications (TC) Vision***

An internet-like transport architecture between space, air and ground nodes

- Integrated Space, Air and Ground Networks
- Global access to deployed / mobile Users (COTM)
- Timely delivery of air and space data to Theater and CONUS (AISR, SISR support)
- Automated, dynamic, high assurance network operations
- Increased capacity and connectivity: RF and laser communications network

**Network of Networks**

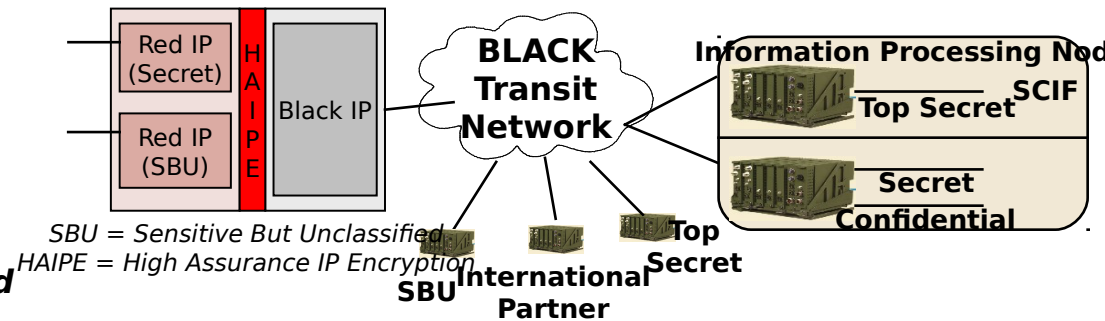
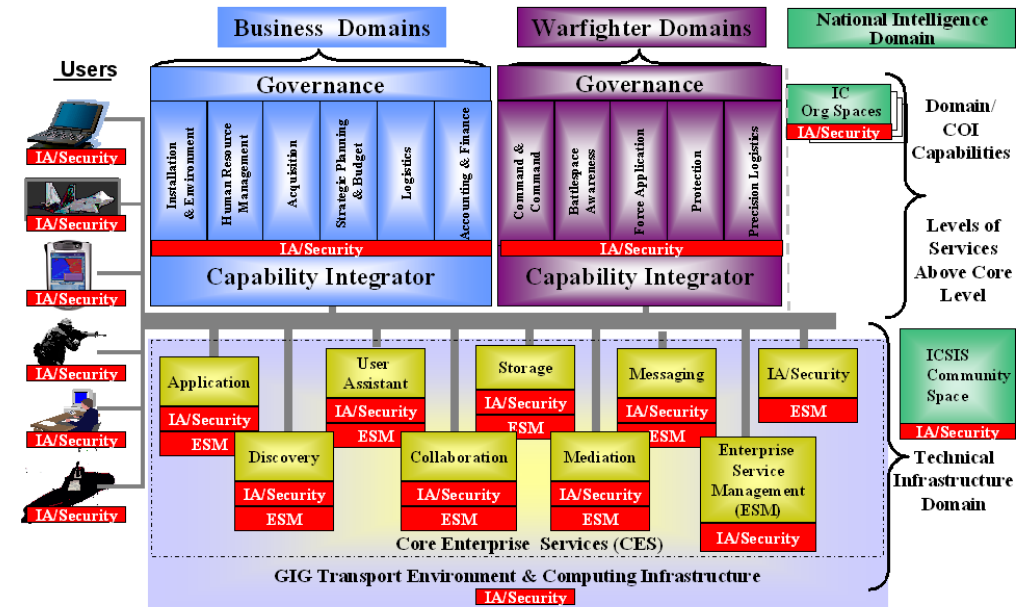


***Enable Future Innovations and Growth Through A Flexible Yet Secure Network Architecture***

# GIG: Fundamental Shift in Information Management and Assurance

- Information and services accessed ubiquitously by **authorized** users -- both human and automated
  - Based on a metadata construct & globally shared services
- Environment that recognizes who you are, **and limits access based on**, who and where you are
- Fully IP-based **highly available** network providing:
  - Converged voice, video, data and imagery
  - High capacity and sufficiently **secure** to support **communications** requirements of mission critical users
  - Support for fixed and ad hoc COIs - (dynamic, adaptive, self reconfiguring)
- Seamless and **secure end-to-end** interconnected information environment
- Secure** interoperability - within/ across DoD, IC and other Government, industry, international partners
- Common infrastructure support -- network management, **security management, attack sensing and** **Fundamental transformation in information management, communication, and assurance**
  - Augmented to meet DoD's mission critical user requirements: **availability, confidentiality,**

GIG Enterprise Services



***Pulling It All Together***

***Systems Engineering  
Test Facility***

# ***GIG & EIE MA E2E Systems Engineering***

## ***Oversight***

This is a matrix organization - people functionally support the E2E Systems Engineering Oversight process

**ASD(NII) / DoD CIO**

**Senior GIG & EIE MA Systems Engineer (NII)**

**Chair: Senior GIG & EIE MA Systems Engineer (NII)**

**GIG E2E Evaluation Facility (NRL)**

**GIG & EIE MA Senior Systems Engineering Board**

**Members: Senior Sys Engineering Rep from:**

Army, Navy, AF, USMC, AT&L, USD(I), DOT&E, Joint Staff J-6, STRATCOM, JFCOM, IC, DISA, NSA GIG IA SPO, TCO, TCM MJPO, GIG-BE SPO, JTRS JPO, NCES SPO, GIG Architect, and E2E Eval Facility

## **Focus Areas**

form/disband as required)

**GIG & EIE MA End-to-End Systems Engineering Working Group**

**Chair Transport**

**Chair Enterprise Services**

**Chair Apps & Data**

**Chair (DISA) QoS**

**Chair Net Mgt**

**Chair NETOPS**

**Chair (NSA) Information Assurance**

**"Sub-Working Groups" & Tiger Teams**

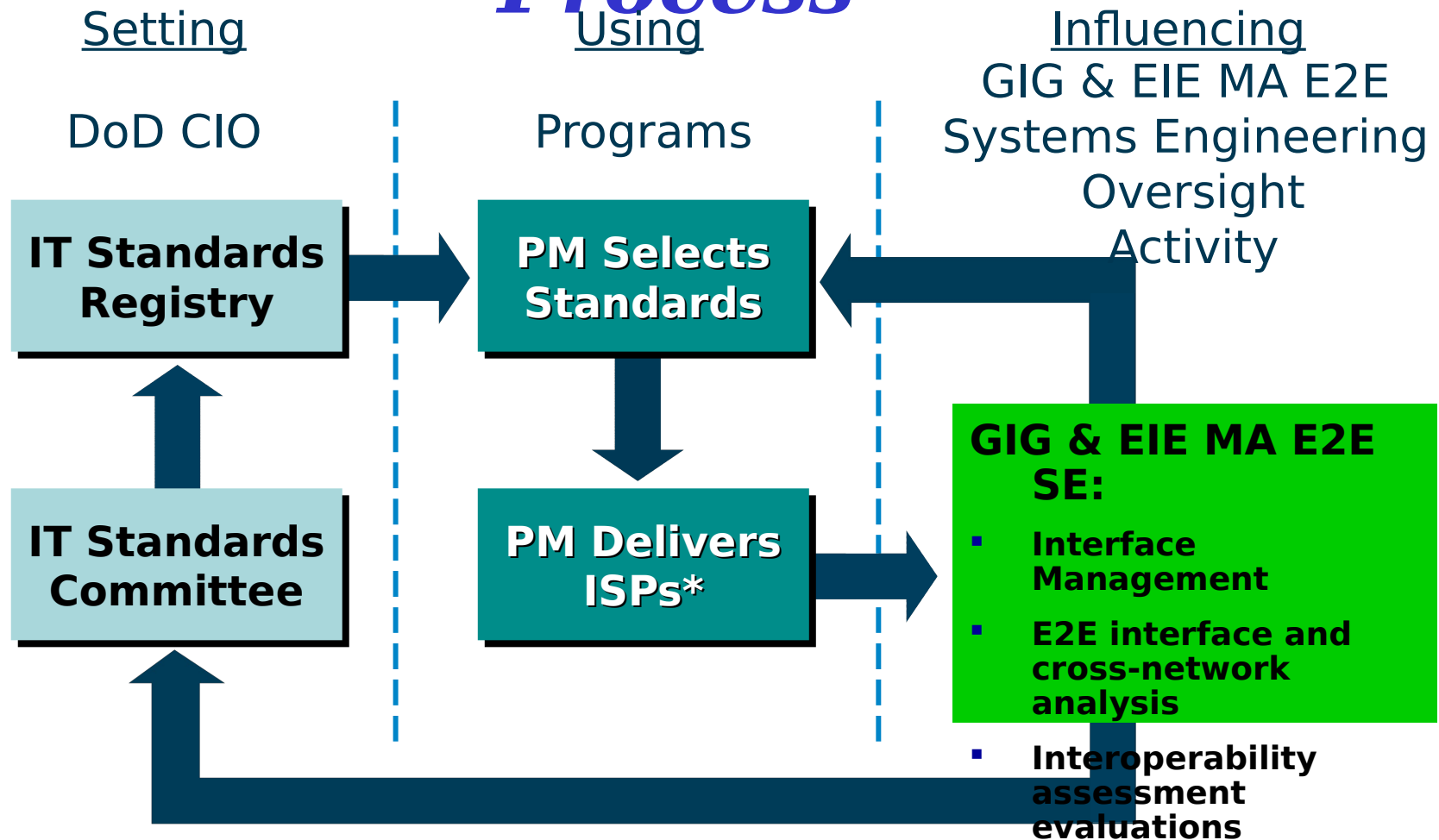
**...for each area**

**"Sub-Working Groups" & Tiger Teams**

**...for each area**

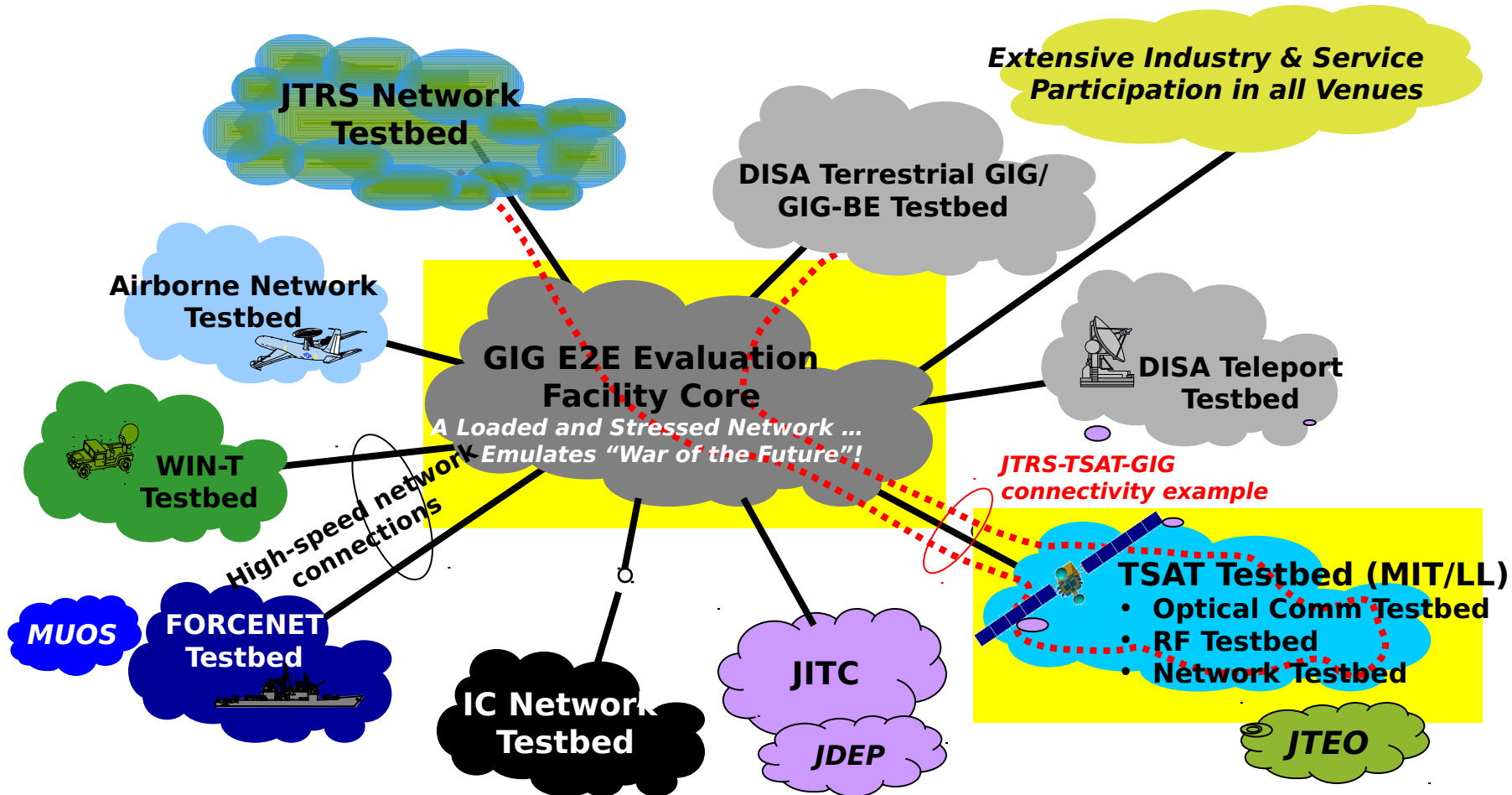
**HAIZE "Tiger Team"**

# *Systems Engineering Influencing Standards Process*



\*ISP—Information Support Plan

# ***GIG E2E Evaluation Facilities***



***A Place to Test Early and Test Often***

# *NATO Network Centric Capability*



- Feasibility Study and Coordinated CONOPs
- Common standards, interfaces, and protocols between core segments of the NATO networks
- Framework for Inter domain transport management and control, routing protocols, and Information Assurance

# ***GIG End-to-End Near Term Focus***

- **Program of Record Execution**
- **Moving All Service Programs to Meet the Vision**
- **Address Coalition and International Participation**
- **Information Assurance**
- **Performance & Scalability**
- **End - to - End Engineering and Test**

***Understand and reduce the risk***